BY ORDER OF THE COMMANDER
AIR FORCE MATERIEL COMMAND

AFMC INSTRUCTION 21-112

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Maintenance

REPAIR OF AIRCRAFT ENGINE CRITICAL PARTS

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

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This Instruction implements AFPD 21-1, *Managing Aerospace Equipment Maintenance*. It gives policy and instruction for the repair of aircraft engine critical parts. These policies/instructions shall form the framework for a secure and reliable operation of aircraft engines, develop an AFMC critical parts repair program, develop repair techniques and establish repair sources. It applies to Oklahoma City Air Logistics Center Propulsion Directorate (OC-ALC/LP) and Aeronautical Systems Center Propulsion Directorate (ASC/LP)

SUMMARY OF REVISIONS

Update the policies and procedures and changes in organizations and cited regulations.

Chapter 1

POLICIES, PROCEDURES AND RESPONSIBILITIES

1.1. Policies for Repair of Aircraft Engine Critical Parts are as Follows: Solicitations for the repair of critical parts are based on the following assumptions:

- A need exists for the repair of the part.

- The repair will allow the part to meet its full service life requirement and not less than one depot inspection interval.

- An Air Force approved repair process either exists or can be developed.

- A qualified repair source exists.

- Only bids or proposals from qualified repair sources are considered when pursuing a repair contract. However, the Air Force shall not refuse a prospective source the opportunity for evaluation as explained in paragraph **1.1.1.** and **1.1.2.** If OC-ALC/BC agrees with the CEA that sufficient approved sources already exist to provide the Air Force with full competition, the evaluation may be conducted at the prospective source's expense.

1.1.1. Public Law (PL) 98-525 requires the government to document justification for qualification requirements and make these requirements, as well as the costs of testing and evaluation, available to any potential source. Guidance on this policy is contained in FAR 9.2 and its supplements.

1.1.2. Personnel involved with selecting and approving repair sources for critical parts shall be familiar with PL 98-525, FAR subpart 9.2 and its supplements.

1.1.3. The Oklahoma City Air Logistic Center Propulsion Management Directorate (OC-ALC/LP) will implement repair processes to repair unserviceable critical parts whenever economies can be realized from the repair or when relief is needed from a supply support deficiency.

1.1.4. When appropriate, the OC-ALC/LP will contact other DoD agencies and commercial users of items common to each for their experience on repair processes or repair sources.

1.2. Implementation Policies:

1.2.1. Responsible CEA shall develop/maintain a current list of engine critical parts for which repairs have been approved and a corresponding list of sources authorized to accomplish those repairs. The list of sources shall be available to OC-ALC/BC.

1.2.2. Repair sources may be removed from the qualified repair source list or be required to requalify when:

1.2.2.1. Any of the conditions (currently 10) exist that merit removal or omission as stated in FAR 9.207(a).

1.2.2.2. The repair source no longer meets all specified requirement of the approved repair source qualification requirement, including:

1.2.2.3. The source has not delivered the item or similar item within 36 months.

1.2.2.4. There is documented evidence of poor delivery or poor quality performance on the art under review for repair authorization.

1.2.2.5. Significant changes in the item or repair process have taken place.

1.2.2.6. There has been a change of repair location or facility.

1.2.2.7. There has been a loss of contractual arrangement with the owner of any required proprietary processes.

1.2.2.8. There has been a change of ownership.

1.2.3. Although the CEA should contact BC directly to request a currently approved source to re-qualify, OC-ALC/BC, through OC-ALC/PKCC, shall be notified when a previously approved repair source has been removed from the qualified repair source list. OC-ALC/BC will advise the repair source of action taken and include substantiating rationale as provided by the CEA.

1.2.4. Responsible CEA shall follow the recommendations of the Propulsion Center of Excellence (PCoE) Best Practices REPAIR DEVELOPMENT PROGRAM, PCOE BP 98-3, and establish realistic standards or requirements for testing and acceptance for both new repair processes and new repair sources. Priority for the development of qualification documents shall be based on anticipated future requirements.

1.2.4.1. Pursuant to FAR 9.2 as supplemented, the CEA shall prepare a Justification for the Qualification Requirement. The justification and the qualification requirement requires the review and coordination of the procuring activity's Small Business Office, the Small Business Administration Procurement Center Representative, if available, and Competition Advocate. The COCO is responsible for approving the required justification and qualification requirement. The justification for qualification requirements shall include:

1.2.4.1.1. Description of Supplies or Services: Specify repair of the part.

1.2.4.1.2. Criticality of the product, and whether or not its failure could compromise personal safety, equipment safety, or mission success.

1.2.4.1.3. Complexity of the repair including special materials, repair processes, and quality controls.

1.2.4.1.4. Rationale as to why the qualification requirement must be demonstrated before contract award. Include the hazardous consequence of not performing tests as preaward qualification tests and specify why tests cannot be conducted post award.

1.2.4.1.5. Cost of qualification testing.

1.2.4.1.6. The Qualification Requirement, specifying all requirements that a potential offeror (or its product) must satisfy in order to become qualified.

1.2.4.2. Pursuant to DFARS 209.202, the inclusion of the qualification requirement in an acquisition or group of acquisitions requires approval by the chief of the contracting office.

1.3. Responsibilities Defined for the Repair of Aircraft Engine Critical Parts are as Follows:

1.3.1. OC-ALC/LR:

1.3.1.1. Develops policies and procedures dealing with engine critical parts repair.

1.3.1.2. Reviews, interprets and establishes policies/procedures for specific OC-ALC actions that are not governed by this regulation.

1.3.2. OC-ALC/BC:

1.3.2.1. Serves as principle point of contact for source qualification as described in AFMCFARS 5309.2.

1.3.3. Cognizant Engineering Authority:

1.3.3.1. Determines the need for new repair procedures and initiates appropriate actions.

1.3.3.2. Prepares or acquires the necessary documentation to perform standard testing and inspection/validation of potential repair processes and repair sources.

1.3.3.3. Reviews repair source approval packages received from OC-ALC/BC and makes final approval/disapproval decision.

1.3.3.4. Documents all actions taken under this program and ensures that necessary decisions for each step contain the proper level of approval.

1.3.3.5. Maintains a list of engine critical parts, approved repair processes, and the associated approved repair source(s).

1.3.3.6. Establishes local procedures to screen items for possible Expendability Recoverability Reparability Category (ERRC) Code changes according to AFMAN 23-110.

Chapter 2

DEVELOPMENT OF REPAIR PROCESSES

2.1. Development of Repair Processes. A process to repair a critical part will be developed as a result of a shortage of new parts, or when the cost of repairing a used part is significantly lower than the cost of buying a new part. The procedure used to repair a part can originate from several places (e.g. the source of the repair, CEA, the engine manufacturer, etc.). Regardless where the process originates, the CEA Authority must control and approve these repair procedures.

2.1.1. Repair processes are usually developed by the engine manufacturer during the initial engine development or under the Component Improvement Program (CIP). Otherwise, when it is determined that a new repair process is needed, the CEA Authority shall:

2.1.1.1. Contact current engine source of repair.

2.1.1.2. Contact selected engine manufacturers.

2.1.1.3. Contact selected industrial facilities.

2.1.1.4. Contact OC-ALC/BC, who will in turn synopsize the requirement to develop the new repair process.

2.1.2. When a new repair process is developed following, an industry or the organic industrial facility may be asked to review, comment, and make recommendations on it. The review will ensure:

2.1.2.1. The repair will be based upon sound engineering practice and the PCoE Best Practices REPAIR DEVELOPMENT PROGRAM, PCOE BP 98-3.

2.1.2.2. The repair will allow the part to fulfill its design service life and the repair will not need to be re-accomplished in less than one depot inspection interval.

2.1.2.3. Qualification will be demonstrated on a component that exhibited the distress and was repaired; hazardous waste considerations; and any special quality control procedures required.

2.1.3. If technical differences arise, the final decision is of the CEA.

2.1.4. When a repair process is authorized for repeated application, controls will be established to assure the repetitious repair does not degrade the integrity of the part or the end item.

2.1.5. Appropriate Technical Orders and work specifications will be updated to include the new process.

2.2. Repair Procedures. All proposed repair procedures are processed as follows. Additional steps may be desirable based on the nature of the repair. Initial review will be performed to determine that:

2.2.1. An economic or logistical need exists.

2.2.2. The process is described in sufficient detail with complete data if owned by the government or via specification or process number if proprietary to a prospective contractor, to ensure complete and proper accomplishment by the repair source.

2.2.3. Critical procedural steps, dimensions, and processes are adequately described and emphasized.

2.2.4. Process quality control checks are specified as needed.

2.2.5. The government possesses unlimited rights to any technical data it supplies to a current/potential repair source.

2.2.6. The necessary source qualification requirements and attendant costs are documented.

2.2.7. The proposed process can be adequately tested and substantiated prior to approval or release.

2.2.8. If required, a method exists to identify and track items repaired by the process.

2.2.9. Hazardous chemical usage is minimized and/or eliminated.

Chapter 3

REPAIR SOURCES APPROVAL

3.1. General. When the Air Force seeks contractors to provide repaired critical engine items, only contractors on the qualified repair source list will be solicited. The following paragraphs provide the policies and procedures for a vendor to become qualified through the Repair Source Approval (RSA) process.

3.2. Responsibility. Cognizant Engineering Authority (CEA) of the engine is the final authority for repair source approval and responsible for administering the approval process as described in **Attachment 3**. To accomplish the RSA, CEA may use, as needed, contract technical assistance (CTA) from an outside organization, including OEM. The CTAs act only in an advisory role and CEA remains engaged at all times and makes all the decisions. CEA is responsible for establishing the Qualification Requirement (QR) data package and the estimated time and cost (PL 98-525, FAR 9.2). CEA establishes family grouping data and maintains a list of qualified vendors.

3.2.1. OC-ALC/BC acts as single face to the prospective repair vendors and is responsible for the following:

3.2.1.1. Making information available to the prospective repair vendors.

3.2.1.2. Review of Source Approval Request (SAR) application package for completeness as per **Attachment 2**.

3.2.1.3. Vendor orientation.

3.2.1.4. Arranging initial meeting between the prospective vendor and the CEA.

3.2.1.5. Issuing the final approval or disapproval notice.

3.2.2. The prospective vendor is responsible for following:

3.2.2.1. Gathering all information including, but not limited to, all applicable TOs and TCTOs, application and qualification requirements.

3.2.2.2. Submitting a complete SAR application to OC-ALC/BC as per **Attachment 2**.

3.2.2.3. Providing a schedule.

3.2.2.4. Following through with the qualification process and complying with all requirements.

3.2.2.5. Providing repair parts for process demonstrations.

3.2.2.6. Cost of Contract technical assistance required by CEA.

3.2.2.7. Contractual arrangements with the owners of any proprietary processes.

3.2.2.8. Providing data on similar items with justification for Category II (similar items) certification described later in this policy.

3.3. Need for Additional Repair Sources. Government need for establishing additional repair sources for critical engine parts is primarily determined by the 36-month projection of repair requirements and availability of QR data. A list of engine critical parts that have QR data and 36-month projected repair requirements is available through OC-ALC/BC.

3.4. Solicited and unsolicited SAR. OC-ALC/BC will solicit SAR applications from prospective vendors when a government need arises and process the applications following the procedures in **Attachment 3**. OC-ALC/BC will also accept unsolicited SAR and will prioritize and process them based on government need, as described in paragraph **3.3.**, and availability of CEA resources.

3.5. Categories. Engine critical parts repair source qualification is divided into two categories as follows:

3.5.1. Prospective source demonstrates repair of actual item (category I). This includes repair, testing, and quality assurance of the actual part as described in the source repair certification data package. If the vendor repairs the same part for the OEM or any DOD agency (Navy and Army) and is OEM certified, the CEA may waive the actual repair demonstration and testing requirement. Repair in the same family as the source demonstration repair will only require review of the repair process sheets and routing sheets by the CEA.

3.5.2. Prospective source already repairs similar item(s) (category II). The item is similar to an item or items that a prospective vendor is currently repairing (or previously repaired within the last 12 months) for the OEM, Air force, Navy, or Army.

3.6. Qualification Requirement (QR) Data Package. The CEA has the responsibility for the qualification data package that shall contain, as a minimum, the following:

3.6.1. A COCO approved repair source qualification requirement. It will include test, measurement, and inspection criteria and also contain the qualification and quality control acceptance requirements.

3.6.2. A statement of work, which includes conditions to be inspected, serviceable limits, repairable limits, and corrective action required for each condition.

3.6.3. The QR data package shall be available to the vendor prior to submitting a SAR application.

3.7. Approval Procedure. Approval procedure is described in **Attachment 3**.

3.8. Dispute Resolution. During qualification process, if there is an unresolved dispute between the prospective vendor and the qualification project engineer, the CEA has the final authority in resolving the dispute. If the vendor does not accept the resolution, the CEA may terminate the process.

3.9. Re-Qualification. When the CEA removes the approval from a vendor for reasons described in paragraph **1.2.2.**, the vendor must re-qualify to remain on the qualified repair source list.

3.10. Documentation. CEA shall maintain a current list of approved repair sources, which will contain the following minimum information:

3.10.1. Identification and description of the part.

3.10.2. Description of the repair and identification of the repair process document.

3.10.3. Name and address of currently qualified repair sources.

3.10.4. Date of qualification of the repair source.

3.10.5. Engineering records will provide records of all source approval activity. These records will be maintained per AFMAN 37-139, table 21-12.

PETER M. TRUMP, Colonel, USAF
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Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

Terms

Chief of Contracting Office (COCO)—Means the first contracting official in the contracting chain subordinate to the Senior Center Contracting Official (SCCO) or an individual within AFMC serving in the position of Chief of the Contracting Division in a System Program Office or Program/Product Directorate in support of a System Program Director, System Support Manager, Development Support Manager, or Commodity Manager. Unless specifically excepted, this term may include, at the option of the designated official, the deputy chief of the same office.

Cognizant Engineering Authority (CEA)—This authority resides with the engineering branch chief of the respective propulsion system.

Engine Critical Part—A component, because of its use or application, whose failure could result in a catastrophic event, causing extensive weapon system damage and/or loss, extensive maintenance actions, possible injury to personnel, and mission impact. Additional definitions of component criticality are provided in MIL-STD-1783 "Engine Structural Integrity Program."

Qualified Repair Source—A government agency or contractor which has proven its capability to repair a particular item by satisfactorily completing established qualification requirements and being reflected in a qualified source list from the Cognizant Engineering Authority.

Qualified Repair Source List—A list of government agencies or contractors qualified to repair a particular item.

Repair Source Qualification Requirement—A government requirement to substantiate specific repair procedures, process control, specialized testing (including laboratory and engine testing) and other quality assurance demonstrations that must be completed before approval of a repair source.

Attachment 2

REPAIR SOURCE APPROVAL APPLICATION REQUIREMENTS

The following paragraphs prescribe what must be submitted when requesting repair source approval for engine critical parts of both Category I and Category II. It is IMPORTANT to provide ALL of the information at the time the application is submitted. Submission of the requested information does not guarantee approval. Additional information, documentation or samples may be required to allow for further evaluation of the application. A site visit to the vendor's facility may be conducted to further evaluate.

A2.1. Category 1: Same Item

A2.1.1. Brochures/synopsis of company's capabilities, capacities, and repair history of same or similar items for the Original Equipment Manufacturer (OEM), Air Force, Army, and Navy.

A2.1.2. Complete and current Depot Maintenance Technical manual(s) required to repair the item for which your company is currently approved including test procedures.

A2.1.3. Copies of purchase orders and shipping documents to OEM, Navy, Air Force or Army for actual item repaired.

A2.1.4. Identification of major sub-vendors, performing selected repair and/or critical processes, together with documentation demonstrating approval and identification of source(s) (e.g., approved suppliers or federal supply system) to be used for spare/repair parts.

A2.1.5. Description of Quality Program (e.g., ISO 9000 or OEM quality rating) and company's Quality Assurance Manual. In addition, a copy of latest survey results performed by government agency and/or prime contractor. Survey results include site or pre-award surveys.

A2.1.6. Summarization of quality deficiencies experienced in the past three years during repair.

A2.2. Category 2: Similar Item - Item Similar To One Previously Repaired For OEM, Navy, Air Force Or Army.

A2.2.1. Brochures/synopsis of company's capabilities (if not previously provided). Identify if you are a non-repair source or the actual repair source.

A2.2.2. Complete and current Depot Maintenance Technical manual(s) required to repair the item for which your company is currently approved, including test procedures.

A2.2.3. Copies of purchase orders and shipping documents to OEM, Air Force or Navy for similar item repaired.

A2.2.4. For the similar item repaired, provide identification of major sub-vendors, performing selected repair and/or critical processes, together with documentation demonstrating approval and identification of source(s) (e.g., approved suppliers or federal supply system) to be used for spare/repair parts.

A2.2.5. Identification of differences between similar item and the item you are seeking approval to repair.

A2.2.6. Description of Quality Program (e.g., ISO 9000 or OEM quality rating) and company's Quality Assurance Manual. In addition, a copy of latest survey results performed by government agency and/or prime contractor. Survey results include site or pre-award surveys.

A2.2.7. Summarization of quality deficiencies experienced in the past three years during the repair of the similar item.

A2.2.8. Copy of inspection method sheets used in repair and final inspection for the similar item. Sheets must be authenticated by quality stamp; no blanks accepted.

A2.2.9. Copy of complete repair specification for the item you are seeking approval.

A2.2.10. Specify how data voids will be filled if data is missing.

A2.2.11. Specify if test/repair procedures for the item you are seeking approval to repair require development or modification and the relationship between the similar item's test procedures and those required by the item for which you are seeking approval.

A2.2.12. Identify test equipment to be used to test both the similar and the item you are seeking approval to repair. In addition specify availability of in house test equipment to be used in lieu of test equipment listed in the approved technical manuals, Acceptance Test Procedures/Acceptance Test Requirement.

A2.2.13. Specify availability of in-house test equipment for the item you are seeking approval to repair, whether it has to be purchased, built, or government furnished.

A2.2.14. For the item for which you are seeking approval, provide identification of major sub-vendors, performing selected repair and/or critical processes, together with documentation demonstrating approval and identification of source(s) (e.g., approved suppliers or federal supply system to be used for spare/repair parts.

A2.2.15. Technical briefing is recommended to further demonstrate procedures your company will employ to validate repair.

Attachment 3

REPAIR SOURCE APPROVAL PROCESS

A3.1. This process provides for interaction between the applicant and OC-ALC/BC from initial inquiry to approval or disapproval notification. It ensures that programs, systems, and intended methods of compliance are thoroughly reviewed, evaluated, and tested. The approval process consists of five phases:

A3.1.1. Pre-application Phase.

A3.1.2. Application Phase.

A3.1.3. Document Compliance Phase.

A3.1.4. Demonstration and Inspection Phase.

A3.1.5. Approval Phase.

A3.2. Pre-application Phase.

A3.2.1. An applicant should conduct a thorough review of the appropriate regulations, technical documents including qualification requirement data package to understand requirements for personnel, facility, equipment, experience, and expertise to perform the repairs.

A3.2.2. The vendor submits a letter of intent to OC-ALC/BC with the following information:

A3.2.2.1. Company background.

A3.2.2.2. Expertise.

A3.2.2.3. Capability.

A3.2.2.4. Capacity.

A3.2.2.5. Experience in DoD engine repair work.

A3.2.2.6. Intended part(s) to repair.

A3.2.3. OC-ALC/BC and the CEA review the letter of intent and the attached documents and if required, have a face-to-face discussion with the vendor. At that point CEA decides whether or not the vendor qualifies to apply for the repair source approval. OC-ALC/BC conveys that decision to the vendor in writing.

A3.2.4. The CEA may waive the pre-application phase for vendors with good track records of performing repair work on Air Force critical engine parts.

A3.3. Application Phase: After getting qualified to apply in the pre-application phase, the vendor submits to OC-ALC/BC a formal application with inclusions described in **Attachment 2**.

A3.4. Document Compliance Phase. In this phase, OC-ALC/BC reviews the application for content and completeness. The vendor receives a written notification for missing/incomplete information and has 30 days to comply. If the vendor fails to complete the application on time, OC-ALC/BC closes it with appropriate annotation. When the application is complete, OC-ALC/BC arranges a formal meeting with the vendor and the CEA and then transfers the application package to the CEA for the demonstration and inspection phase.

A3.5. Demonstration and Inspection Phase. The CEA assigns an engineer, or a Source Qualification Team (SQT) if necessary, to determine a prospective source's repair capability. Pertinent activities may include, at the engineer's discretion:

A3.5.1. Inspect and evaluate applicant's facility, equipment, and personnel to determine applicant's capability and capacity to perform the repair workload.

A3.5.2. Review process flows and process sheets to insure all repair processes are included in right sequence.

A3.5.3. Observe all aspects of the applicant's required demonstrations and determine compliance or noncompliance in each case.

A3.5.4. Determine conformance with test criteria. The team visually inspects the repaired product and reviews all test (including laboratory test) results to insure that the specified criteria of the final product are met.

A3.5.5. Ensure process control. The team reviews process parameters recorded during the process demonstration and insures that they are within acceptable limits specified in the qualification requirement data package. The team also evaluates the vendor's process quality control procedures.

A3.5.6. Review quality program. Vendor should have an acceptable quality program, such as ISO 9002, in place.

A3.5.7. Ensure the vendor's ability to comply with all applicable sections of Air Force and Federal Regulations.

A3.5.8. Document deficiencies. If, at any time, certain items or the applicant's conduct of activities prove to be deficient, appropriate corrective action must be taken. If necessary, the engineer will advise the applicant of the impracticality of continuing the source approval process due to the extent of the deficiencies. If a particular demonstration of compliance is unsatisfactory, the approval team must discuss with the applicant how to correct the problem. Repeating the process step(s) should be scheduled as necessary. The engineer may want to follow up with a letter indicating the nature of the failure and its corrective action. Deficiencies will have to be corrected before the process can continue.

A3.5.9. Recommend approval or disapproval of the source approval request.

A3.6. Approval Phase. The CEA reviews the report and the recommendation from the SQT and either approves or disapproves the application. This decision is passed on to OC-ALC/BC, who, in turn, notifies the vendor in writing. A copy of the vendor notification will be forwarded to by OC-ALC/BC, to the cognizant contracting office.